

Klocwork InSpect – Product Documentation

Klocwork Inc., Burlington MA, February, 2005

What it is: Klocwork is an integrated suite of tools which include the products InSpect, InForce, InSight and InTelect. InSpect is an automated system-level static analysis tool that has extensive rules for checking logical code problems, metric violations and architecture violations. The static analysis is an exhaustive analysis that uses multiple models including data flow, control flow, semantic, syntactic, and structural models to analyze the code base at hand. InForce performs the same static analysis as InSpect but is utilized at the developer's desktop. InSight is a graphical interface of the all relationships between symbols and components within a system. InTelect is a tool that plots software metrics over time in an automated format.

Features: The InSpect tool provides over 50+ out-of-the box checkers and the ability to customize your own checkers. The InForce tool integrates into multiple IDEs and can be integrated into your IDE of choice. InSight has the ability to perform what-if scenarios so you can fully comprehend the changes you want to make to an existing complicated code base. InTelect provides an easy-to-use interface that allows you to drill into information in a concise manner.

Benefits: The benefits of InSpect are the identification of problematic defects early in the development cycle, which allows the development team and testing team to focus on other important tasks such as fulfilling and testing the functionality of the system. InSpect speeds the development cycle thus saving cost and time.

Successes: Klocwork is working with Dr. Gerard Holzmann at the Laboratory for Reliable Software (LARS) at the Jet Propulsion Laboratory (JPL). Dr. Holzmann is providing effective solutions for software analysis of flight software and uses our tools within the LARS research effort, <http://eis.jpl.nasa.gov/lars/>. Additionally, Klocwork is working with Philip Merritt at the Independent Verification and Validation Facility (IV&V) at Fairmont, West Virginia to have Klocwork working as part of the analysis to improve software safety, reliability and quality, <http://www.ivv.nasa.gov/>.

Contexts in which it is best used: Klocwork InSpect is best applied to C, C++ and Java source code that follows standard C, C++ and Java programming guidelines. Klocwork is an analysis tool that requires a shared or dedicated system that runs at a minimum one to two 2.5+ Ghz CPU, has 200+ GB of disk space, 512+MB of memory and is running Linux, Windows or Solaris operating system. Teams that need to verify that defects are not present prior to the code entering the testing cycle will be best served by using InSpect. With the use of InForce the same analysis can occur at the developers desktop. Klocwork InSpect is intended for improving software quality and reliability on applications where exhaustive testing for field level defects is infeasible and the additional up-front cost of time spent performing the analysis is offset by the money and time saved in the testing phase since testing can focus on conformance to the specification.

Compare with alternative known products or technologies. LINT is another tool that can perform static analysis of C and C++ code but tends to report too many false positives and does not have an effective mechanism to prioritize and assess the issues discovered. Another set of tools that tend to be compared to static analysis is the dynamic tools such as Mercury Interactive and Parasoft tools. The dynamic analysis requires that the code be executed to find defects or issues, where as static analysis technology does not require the code to execute to perform the analysis.

Usability. Klocwork is one of the most usable systems on the market today. The tool has automated build mechanisms to integrate seamlessly into any standard make system with only two commands. The tool also has standard integration tools for builds using Microsoft c/c++. The resulting Klocwork build can be managed through the command line or through a GUI interface.

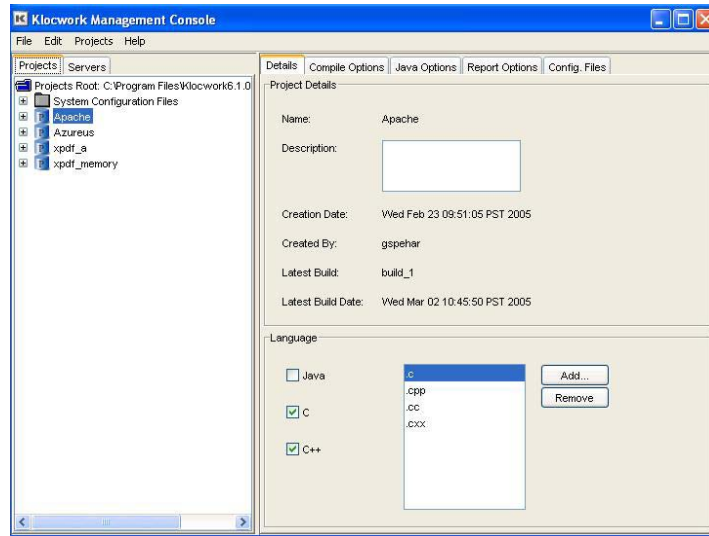


Figure 1: Klocwork Management Console (KMC).

Additionally, the InSpec report is output to a simple web portal interface that is easy to navigate from project level to the build level allowing the development team to focus on the task of finding and removing defects as shown in Figures 2 and 3. Additionally, the tool will show the details of the coding issue with the offending code in as shown in figure 4 and 5.

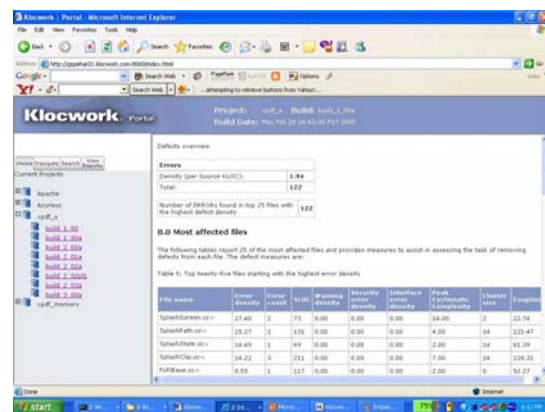
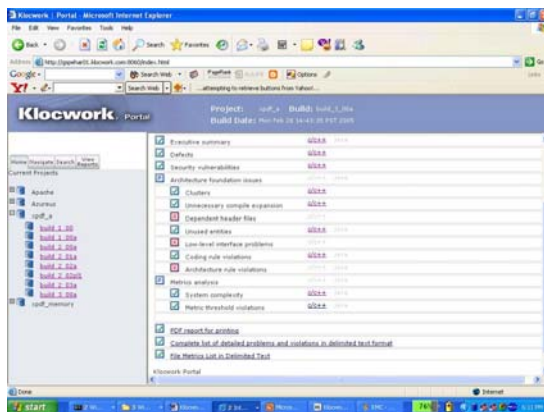


Figure 2 and 3: InSpec Report Portal and Defect listing.

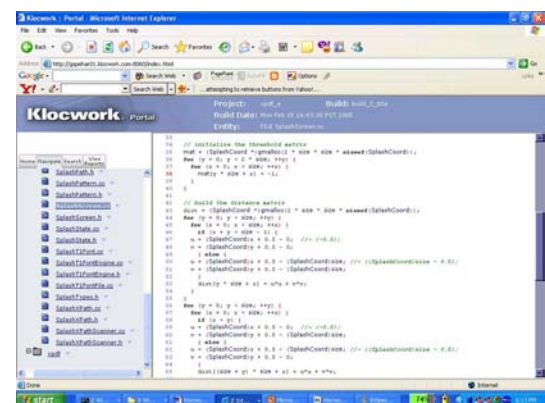
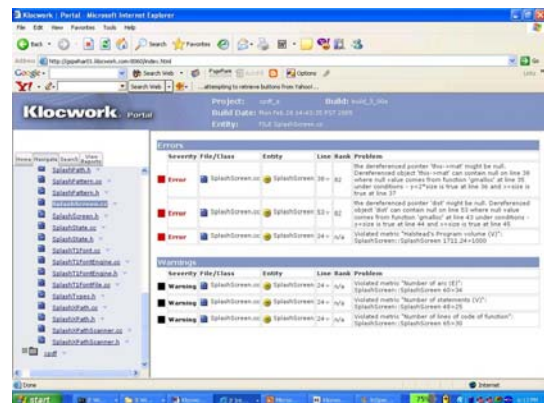


Figure 4 and 5: InSpec Report Portal and Defect listing.

Finally, the tool will allow you to triage the issues found and deliver them to the bug tracking system of your choice. Where the tool integrates into the team's bug tracking system and project tracking systems with limited integration effort. With the use of the state of the art klocwork defect tracking tools the Klocwork Tool Suite is one of the easiest and most accurate static analysis tools on the market today.

What will a successful collaboration look like?

- a. **What will you as the technology provider do?** We will work with you during proposal development, tool deployment and tool support/maintenance. For a collaboration using Klocwork, we will provide an initial installation and a 1/2-day mentoring at your site, followed by a 1-day system integration and mentoring and customer telephone support over the course of the collaboration. We will also put you in touch with other NASA groups using Klocwork tools. For a short (6-month) collaboration we suggest focusing on 'out-of-the-box' capabilities of Klocwork InSpect (such as null-pointers or memory leaks), and not on formalizing additional specifications until the evaluation period is complete.
- b. **What should the development team do?** Prior to the collaboration, the NASA software development team should communicate with us to determine whether its application is a good one for Klocwork InSpect and to verify that systems are available to load the Klocwork toolset. During the collaboration, take the follow the mentoring; identify the builds to which Klocwork InSpect will be applied; apply InSpect to the builds, collect data/reports on its performance, and compare with existing V&V performance data and historical testing and field defect reports.
- c. **How will you, as technology provider, work together with the development team to ensure a successful collaboration?** During the proposal process, we will assist in ensuring success by verifying a good technical and project match is selected with our technology. In addition to customer providing support for Klocwork InSpect, we will track the collaboration's schedule, and at appropriate points proactively contact the Collaboration PoC, learn about problems or potential problems, obtain preliminary data, offer suggestions on how to proceed, and follow up to ensure that Klocwork InSpect is being used effectively and the collaboration is achieving its success criteria.